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tion to this statement, in the case of the strong band in the yellow which is possibly identical with the nebulae line at λ 575. Judging by the history of objects of this class, however, there should be little hesitancy in venturing the opinion that within a year the spectrum will be completely transformed and will develop the radiations, so closely related to those of the gaseous nebulae, which are characteristic of new stars in the secondary periods of their existence.

W. H. WRIGHT.

MOUNT HAMILTON, January 23, 1911.

NOTES ON THE D. O. MILLS EXPEDITION TO THE SOUTHERN
HEMISPHERE.

In December, 1900, the late Mr. D. O. MILLS made generous provision for an expedition from the Lick Observatory, University of California, to the southern hemisphere, with purpose to observe the radial velocities of the brighter stars in the southern sky. The plans called for observations covering two years, following the completion of the observing station. A description of the observatory located on the summit of San Cristobal, Santiago, Chile, has been given in the *Publications* of the Society, and need not be here repeated.

During the first period of observation the expedition, in charge of Astronomer W. H. WRIGHT, observed with great accuracy the radial velocities of about one hundred and fifty stars south of declination -30° . The results have been in manuscript form nearly three years, but there have been no funds in the State Printing Office to publish them. Publication is now proceeding through the University Printing Office on the basis of funds generously supplied for this purpose by Mrs. HEARST.

Early in the year 1905 Mr. MILLS provided for a further period of observation covering five years, 1906-1911. The adopted program for this period included observations of additional bright stars with a 3-prism spectrograph, and of fainter stars with a 2-prism spectrograph. This period of observation is near its close. Astronomer HEBER D. CURTIS was in charge of the expedition during the years 1906-1909, and Astronomer JOSEPH H. MOORE has been in charge since June, 1909.

The expedition has been fully as efficient as the original plans anticipated. Up to December 1, 1910, Messrs. WRIGHT, CURTIS, and MOORE, and their assistants had secured 3,608 spectrograms of about 725 stars. These stars, with insignificant exceptions, are south of declination -20° . Essentially all of these plates have received definitive measurement and reduction. The list of stars observed includes a large proportion whose velocities are variable,—that is, of stars attended by close and massive companions. There are also a considerable number of stars whose spectra contain poorly defined lines incapable of measurement.

The immense value of stellar radial velocities in the solution of the great problems of the sidereal system, and the demand that these observations be secured for stars as faint as the power of the instruments will permit, made it important that the work of the expedition should not cease when we came to the end of resources provided during the lifetime of Mr. MILLS. On presenting this phase of the subject to Mr. MILLS's son, Mr. OGDEN MILLS of New York, he was pleased to extend the life of the expedition for a period of two years, 1911-1913, with increased annual resources corresponding to the advance in prices in the past five years.

Before the conclusion of the second period four or more satisfactory observations will have been secured for every star as bright as the 5.0 visual magnitude contained in the Revised Harvard Photometric Catalogue, excluding those stars whose spectral lines are not measurable with the high dispersion thus far employed, together with one or more observations of approximately 150 stars fainter than the fifth magnitude. It is not possible at the present time to state definitely what the observing program will consist of for the third period, 1911-1913. Provisionally, the program includes 2-prism spectrographic measurement of radial velocities of all stars lying between 5.0 and 5.5 visual magnitude, situated south of declination -25° , and all stars between the same limits of magnitude in the additional region bounded by declination circles -15° and -25° , and hour circles two hours on the west and fourteen hours on the east. The region last described, 10° wide in declination and twelve hours long in right ascension, is a

rainy-season region for Mount Hamilton, and a dry-season region for Santiago. It can therefore be observed advantageously from the latter station.

The expedition will also undertake, very soon, a spectrographic measurement of the radial velocities of as many nebulae as possible in the southern sky, in extension of Professor KEELER'S invaluable measurements at Mount Hamilton of the velocities of thirteen nebulae in the northern sky. At Mount Hamilton an effort will be made within the coming year to determine the velocities of nebulae additional to KEELER'S thirteen. It is not anticipated that the number of nebulae observable for radial velocity by our equipments at Mount Hamilton and at Santiago can be large, but it is of the utmost importance that we know the radial velocities of as many nebulae as possible. Professor KEELER'S average velocity for thirteen nebulae is greater than the average velocity of the stars. It may be that this result is fortuitous, due to the number being too small for use as a basis for determining averages. If we know the velocities of from thirty to fifty nebulae, we could reason with greater confidence as to the relationship existing between nebular and stellar velocities.

W. W. CAMPBELL.

SECOND NOTE ON COMET *e* 1910 (CERULLI-FAYE).

From observations taken on November 9th at Rome by MILLOSEVICH and November 27th and December 12th at the Lick Observatory by YOUNG, we have computed a second set of elements for Comet *e* 1910 (CERULLI-FAYE).

They are as follows:—

$$\begin{array}{rcl}
 T = 1910 \text{ Nov. } 1.46164 \text{ Gr. M. T.} & & \\
 \left. \begin{array}{l} \omega = 199^\circ \quad 17' \quad 14''.8 \\ \Omega = 206 \quad 14 \quad 13.8 \\ i = 10 \quad 35 \quad 37.5 \end{array} \right\} 1910.0 & & \left. \begin{array}{l} \omega = 199^\circ \quad 17' \quad 13''.5 \\ \Omega = 206 \quad 15 \quad 5.3 \\ i = 10 \quad 35 \quad 37.1 \end{array} \right\} 1911.0 \\
 e = 0.565605 & & \\
 \mu = 477''.036 & & \\
 \log a = 0.580971 & & \\
 q = 1.655222 & & \\
 \text{Period} = 7.43800 \text{ years} & &
 \end{array}$$

This set of elements from a 33-day arc agrees very closely with STRÖMGREN'S elements of FAYE'S comet.¹ Professor

¹ *Astronomische Nachrichten*, 4,456, p. 271.